

and *S. viviparus*, which have "fifteen" dorsal spines, and which are indeed the types of the genus, but that gentleman has shown his appreciation of the value of the character, and has only been unhappy in its application: he should have given a new name to the genus defined by him. Dr. Ayres has omitted to inform his readers that the difference in the number of dorsal spines is also supported by a corresponding difference in the number of vertebræ, the species of "*Sebastichthys* having, as far as known, only ten abdominal and fourteen caudal vertebræ,"* while *Sebastes* has about twelve abdominal and nineteen caudal vertebræ.†

The value of the characters used to distinguish the genera *Sebastes*, *Sebastichthys* and *Sebastodes* is now indeed so generally conceded by scientific men, that it is unnecessary to further argue in their favor. I shall only remark that the combinations and distinctions of forms by Dr. Ayres are alike unnatural and violate all natural affinities, and that the distinctions used by him to separate his genera *Sebastes* and *Sebastodes* are only of secondary value. More acquaintance with the species of the family would undoubtedly convince him of the justness of this assertion.

Dr. Ayres has been unfortunate in at least one of his identifications, connecting Girard's name *Sebastes rosaceus* with a species of "*Sebastodes*," with the remark that "this is the species originally described by Girard under the name *rosaceus*; and again, quite correctly, in the tenth volume of the 'Pacific Railroad Reports.'" Yet *S. rosaceus* is said to have "the upper surface of the head with horizontal and acute ridges," and is figured with such armature as well as with the second, instead of the third, anal spine longest, the pectoral and ventrals ceasing before the vent, &c.! Girard's *Sebastes rosaceus* is indeed a typical *Sebastes* of Ayres, and entirely identical with the *S. helvomaculatus* of the latter, as the examination of the two specimens known to Girard has convinced me. The specimens are in poor condition, but the spots are still visible. The *Sebastodes rosaceus* of Ayres is therefore deprived of a name, and may receive that of *Sebastosomus*‡ *pinniger*.

It is also proper to here remark that two species are apparently confounded by Girard under the name *Sebastes melanops*, one with, "a small spine upon the suprascapular bone, two others upon the edge of the opercle," and another from Cape Flattery with the lower opercular spine as well as the supraorbital ridges obsolete, and the forehead between the eyes perfectly arched. The latter may be named *Sebastosomus simulans*.

In conclusion, the genus *Sebastichthys* includes at least three genera. The *Sebastichthys nigrocinctus* is somewhat related to *Scorpena*, and distinguished by elevated, serrated coronal crests. Other Californian species represented by the *Sebastes melanops*, seen by me, differ so much that they may be separated and combined for the present under a genus *Sebastosomus*, of which the *Sebastes melanops* of Girard may be taken as the type. Still others, distinguished by the texture of the bones of the skull, armed orbital ridges, prefrontals, &c., and represented by *Sebastes rosaceus*, Grd., may be named *Sebastomus*. In a contemplated Monograph of the Scorpenoids of California, the relations of the species will be more fully discussed.

Second Contribution to the SELACHOLOGY of California.

BY THEODORE GILL.

Since the publication of the article "On the Classification of the Families and Genera of the Squali of California,"§ additional information has been

* Gill, Proceed. Acad. Nat. Sci., Phila., 1862, p. 278.

† The increase in the number of vertebræ in the species of *Sebastes*, a genus peculiar to the Northern Seas, affords an excellent example of the truth of the generalization claiming an increased number of vertebræ for the cold-water representatives of the families of Acanthopterygians.

‡ *Sebastosomus*, Gill. Type *Sebastes melanops*, Girard.

§ Proc. Acad. Nat. Sciences, Phila., 1862, pp. 483—501.

given in the "Bulletin of the Museum of Comparative Zoology," by Mr. F. W. Putnam, in a "List of Specimens sent by the Museum to different Institutions," and in the Proceedings of the California Academy of Natural Sciences by Dr. W. O. Ayres.* The former enumerates the *Triacis semifasciata*, Girard, *Triacis Henlei*, Putnam (= *Rhinotriacis Henlei*, Gill) and *Acanthias Suckleyi*, Girard (= *Squalus Suckleyi*, Gill.) Dr. Ayres has in one article announced, very modestly and with scarcely a due appreciation of its bearings, a startling discovery regarding the range of variation of dentition in the Notidanoids, and in a subsequent communication, has informed us of the discovery of a representative of the genus *Alopias* in the Bay of San Francisco.

Family ALOPECOIDÆ.

Genus ALOPIAS, Raf.

We are indebted to Dr. Ayres for the "Notice of the acquisition of a specimen of Thrasher," taken in the Bay of San Francisco. The species is a very close representative of the Atlantic form *Alopias vulpes*, differing, however, in the proportions of the dorsal and anal fins, and in the position of the branchial apertures; the tail constitutes decidedly more than half of the entire length. The specimen is about five feet in length."—(Ayres, op. cit., vol. iii. p. 66.)

Dr. Ayres has abstained from naming this species, and it may be hoped that the true differences between it and the Atlantic species will be exhibited by the future nomenclator. The announcement of any difference in the position of the branchial apertures from one not acquainted with the type, will be viewed with much skepticism by selachologists.

Family GALEORHINOIDÆ, Gill.

Subfamily MUSTELINÆ, Gill.

Genus MUSTELUS, Cuv.

This name may be reserved for the species distinguished by the anterior position of the first dorsal fin and the unicuspid teeth of the jaws. The *Mustelus levis* of Müller and Henle is consequently excluded, the first dorsal fin being nearly midway between the pectoral and ventral fins, and the teeth provided with a lateral cusp in addition to the usual median one; the foetus is also intimately connected with the uterus by means of a vitelline placenta, according to Müller and Henle, and is thus essentially distinguished from the typical *Musteli* which resemble the other *Galeorhinoïds*. That species is therefore a peculiar generic type, and may hereafter be called *Pleuracromylon levis*.

If the rule now adopted by many of invariably retaining a generic name for the first species mentioned is adopted, *Galeorhinus* will supplant *Mustelus*. I am not yet, however, prepared to adopt that rule, and shall for the present retain the name *Mustelus*. *Galeus* cannot be used for the genus typified by the *Squalus galeus* of Linnæus, and if *Galeorhinus*, which has been retained for it, should be shifted to *Mustelus*, a new name will be demanded for the former; as it is desirable that the change should be as slight as possible, that of *Eugaleus* may be accepted.

MUSTELUS CALIFORNICUS, Gill.

The first dorsal fin commences over the terminal third of the inner free margin of the pectoral fin, and its posterior point, though acutely prolonged, ceases considerably in advance of the ventral fins. The anterior angle is blunt, but not rounded. The second dorsal is similar in form to the first,

* Proc. Cal. Acad. Nat. Sciences, vol. iii. pp. 15, 66.

but smaller, and its hinder half is over the anterior two-thirds of the anal, with the posterior angle of which its own is co-terminal. (The caudal fin, from the front of the lower lobe to its point, equals the distance between the snout and the interval between the third and fourth branchial apertures; its terminal lobe little exceeds a fourth of its length, and is squarely truncated behind?) The ventral fin has its outer margin, from the base to the angle, about as wide as the width from that angle to the posterior point. The length of the rostral plateau in front of the jaw equals the width between the outer margins of the nostrils and the interval between the corner folds of the upper jaw.

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This species is distinguished by the proportions of the snout, the more acutely prolonged posterior angles of the dorsal and anal fins, and perhaps the form of the terminal lobe of the caudal; but it is probable that the latter is worn, and consequently the statement of the length of the fin and the form of the posterior lobe must be accepted with reserve. The number of cartilaginous rays found after dissection of the skin is less than in the European species.

A single adult specimen was obtained by Dr. Stimpson at San Francisco, during his visit to that city as a member of the Scientific Corps of the North Pacific Exploring Expedition.

From Panama, the Institution has received several specimens of a closely-related species, distinguished by the projection of the posterior angle of the first dorsal fin to the vertical of the origin of the ventrals, although the anterior fourth of the base of the fin is above the pectoral. The caudal fin equals the distance between the snout and third branchial aperture, and its terminal lobe nearly equals a third of the length, and is obliquely truncated behind. The species may be named *Mustelus dorsalis*.

These species are interesting as being the first species of the genus found in the Pacific waters of America. The *Mustelus felis* of Ayres is a species of *Triacis*!

Family NOTIDANOIDÆ, Owen.

Genus NOTORHYNCHUS, Gill (ex Ayres).

In the year 1855, and in the first volume of the Proceedings of the "California Academy of Natural Sciences" (p. 73), "Dr. Wm. O. Ayres exhibited a specimen of a shark of a new generic type, with the following description" of the genus

"NOTORHYNCHUS, Ayres.

"Dorsal fin single. Branchial apertures seven on each side. Spiracles two. Nostrils double, subterminal. Snout broad, depressed. Tail much elongated, with the fin beneath. Teeth in several rows, those of the lower jaw flattened, arched, serrated; those of the upper jaw of diverse forms, the middle ones slender, the outer ones approximating those of the lower jaw in form."

He remarked, that "the shark here described presents, certainly, a very singular grouping of characters. The only genus with which it can be compared is Cuvier's *Notidanus*, previously separated by Rafinesque under the name of *Heptanchias*, both founded on Lacépède's *Squalus cinereus*. With this our type agrees in the remarkable feature of a single dorsal fin and seven branchial apertures. But in *Notidanus* the teeth of both jaws are represented as similar in form, and the muzzle pointed, the existence of spiracles being asserted by the one author and denied by the other. We have also in our fish the tail almost as much elongated as in *Alopias*."

The characters attributed to the genus *Notorhynchus* are common to all the
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representatives of the family, except the number of branchial apertures; in which respect the genus resembles *Notidamus* or *Heptanchias*. That genus has also the "teeth in several rows; those of the lower jaw flattened, arched, serrated; those of the upper jaw of diverse forms, the middle ones slender, the outer ones approximating those of the lower jaw in form;" the "snout broad, depressed;" "spiracles two,"—the invariable number when developed in all fishes!—and "the tail much elongated, with the fin beneath." *Notorhynchus* is therefore not distinguished by any character whatever from *Heptanchias*, either in the generic or specific descriptions of Ayres.

Such being the case, Girard and myself referred the species to the genus *Heptanchus* or *Heptanchius*, Raf., and the justness of that reference, under the circumstances, will be unhesitatingly admitted by every logical mind.

The causes of Dr. Ayres' manifold errors in the case are unknown; the peculiarity of the dentition of the Notidanoids is described in every text-book of ichthyology, and if Dr. Ayres had even consulted the Animal Kingdom, of Cuvier,—accessible to English students through a number of translations, his error would not have been committed.

Subsequently, I discovered the jaws of a Notidanoid taken at Nisqually, Oregon, by one of the gentlemen attached to Wilke's Exploring Expedition. Finding that the teeth were generically similar to those of *Heptanchus indicus* of Müller and Henle, and resembled them rather than those of the typical *Heptanchi* or *Hexanchi*, and, further, that the teeth of both more nearly resembled those of *Hexanchus* than *Heptanchus*, I felt compelled to combine the two species in a peculiar genus. I thus connected the views of Müller and Henle and others regarding the generic value of the number of branchial apertures with those of Bonaparte as to the generic value of the dentition. As the *Heptanchus indicus* was known to be "dark bluish grey above, with numerous small, irregular, black blotches, lighter beneath," the coloration attributed by Ayres to his *Notorhynchus maculatus*, I ventured to refer the jaws of the Nisqually shark to that species, since color is generally coincident with structure; the limited number of species of Notidanoids, the absence, so far as known, of two closely-related representatives in a single Fauna, and the occurrence of Ayres' species in the same faunal region as the Nisqually shark, appeared to warrant this identification, the necessity of confirmation of which, however, I did then, as I now do, emphatically insist upon. I therefore perfectly agree with Dr. Ayres as to the impossibility of certainty "when [his] description is so extremely indefinite," and, in order that further cavil at the identification of the Nisqually shark with *Notorhynchus maculatus* may be avoided, suggest that the former may be named *Notorhynchus borealis*.

Having previously identified the Nisqually shark with the Californian Notidanoid—erroneously it may be—I felt compelled to retain Ayres' name, and did not detail the history of the genus, as such would have involved the necessity of criticism, but simply remarked that the name "was proposed by Dr. Ayres under a misapprehension."

Immediately after the publication of my article, Dr. Ayres* insinuated that his name was not given under a misapprehension, and asserted that his "'misapprehension' was, that (he) regarded the species as the type of a new genus." Such misapprehension is of course evident, but I cannot perceive why the name should be considered apart from the idea of the genus. I indeed think that the name itself, considered in the abstract, is objectionable and rather unmeaning if not, indeed, more censurable. The etymology of the name is not obvious: its formation would indicate that it meant "back snout, or beak," but it is possible that it is composed of *νθος* and *ρυχος*, in allusion to the protuberant snout.

* Proc. California Acad. Nat. Sciences, iii. p. 15.

Dr. Ayres then implies that it is only after several changes that I have arrived at the conclusion regarding the generic distinction of *Notorhynchus*. I have had two opinions, one, before seeing the species, that it was a *Heptranchias* of Rafinesque or *Heptranchus* of Müller,—accepting the views of Müller and Henle, Gray, Girard, &c.,—and the final one, after study of the Nisqually jaw, that it was the representative of a distinct genus. For that genus I have adopted Ayres' name, but by no means the ideas connected with it by him.

One statement of Dr. Ayres is especially entitled to attention, as, if corroborated, it must effect an entire revolution in our views respecting the value of dentition, and is entirely opposed to the experience of Müller and Henle, Bonaparte, Agassiz, and all others. He remarks that my description of the dentition "represents the individual specimen on which it was founded; but the species is quite common here, and I find that the number and the forms of the teeth vary so much that my original description, which Mr. Gill says is 'equally applicable to any species of the family,' is fully as close as nature will allow us to draw." It is certainly rather unfortunate for science, as well as himself, that Dr. Ayres has omitted to produce proof of so remarkable a discovery, as, on account of the respectability and number of the gentlemen alluded to who have adopted other views, and in deference to whom reasons might be assigned, it will be regarded with at least some doubt and skepticism, notwithstanding even Dr. Ayres' assertion. It is scarcely necessary to remark, that if this discovery is confirmed, *Notorhynchus* must be suppressed and its species referred to *Heptranchias*; but until such is done, it may, without any imputation on the perfect reliability of Dr. Ayres, be retained, since that learned gentleman has himself done so, notwithstanding his discovery and the admission of a misapprehension in regarding its representative as the type of a new genus.

June 7th.

MR. JEANES in the Chair.

Seven members present.

Mr. Gill called the attention of the members to several points in Ichthyology and Conchology. He exhibited from the collection of the Academy a specimen of a species of *Percopsis* obtained by Surgeon General Hammond in Kansas. The differences between it and the *Percopsis guttatus*, Ag., of Lake Superior, also exhibited, were strong; the head is larger, (contained $3\frac{1}{2}$ times in the length, exclusive of caudal;) the dorsal is higher, (the longest ray equal to $4\frac{2}{3}$ of length;) the anal is also higher, (the longest ray contained six times in length;) the pectoral equals the height of the dorsal ($=4\frac{2}{3}$); the ventral especially is longest, contained $5\frac{3}{4}$ times in the length, and its extremity covers the anus, which is nearer the snout than the margin of the caudal fin. The species may be named, in honor of its distinguished discoverer, *Percopsis Hammondi*.

Mr. Gill remarked that, after an examination of the species of *Sodis*, Raf., and *Paralepis*, Cuv., in the collection of the Academy, he was convinced that the families of Paralepidoids and Alepidosauroids were most closely allied.

Mr. Gill next referred to the history of the name *Gymnotus*, showing that it had been originally founded solely on the *Gymnotus carapus*, and that even after the introduction of the *Gymnotus electricus* into the system, the *G. carapus* was retained as the first of the genus. The retention of the name *Gymnotus* for the *G. electricus* and the bestowal of a new one on *G. carapus* are therefore obvious infractions of the laws of nomenclature. The name *Gymnotus* must be retained for *G. carapus*, and a new one given to the *Gymnotus electricus*, Linn.

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